THE VACUUM METHOD OF DRAWING ANTIHOG-CHOLERA SERUM *

THOS. P. HASLAM, A. E. HAGAN, AND R. V. CHRISTIAN

(From the Veterinary Department of the Kansas State Experiment Station, Manhattan, Kans.)

Through a series of experiments a system has been devised whereby blood may be rapidly and aseptically drawn from the tail of a hog by means of a vacuum. This technic is of great importance in the manufacture of the Dorset-Niles antihog-cholera serum, as there are more than one hundred institutions in the United States as well as numerous plants in other parts of the world manufacturing this antiserum. In this paper a brief description of a specially constructed instrument for vacuum tail bleeding, a satisfactory method for the restraint of the hog during bleeding, and an efficient method of separating the defibrinated blood from the fibrin will be given.

RESTRAINT

Any method of restraint in which the hog is held in an upright position is satisfactory unless several are to be bled at the same time by each workman. In this case, it is important that the animal be securely held. By the crate illustrated in Figure 1, the hog is so well restrained that very little attention is necessary during the process of bleeding. Special features that deserve attention are: (a) The hog is lifted completely off its feet. (b) Its back is pressed firmly against the top of the crate. (c) Its nose is held securely.

BLEEDING

After the usual preparation, the hyperimmune is placed in the crate and the entire tail as well as a small area round the root of the tail is washed, shaved, and thoroughly disinfected. One attendant then firmly grasps the tail with a pair of sterile forceps, while the second clips off the end of the tail and removes a plug of sterile cotton from the mouth of the bleeding apparatus. The tail is guided into the open mouth of the bleeding top by means of the forceps and the top pushed up until the mouth touches the body at the root of the tail.

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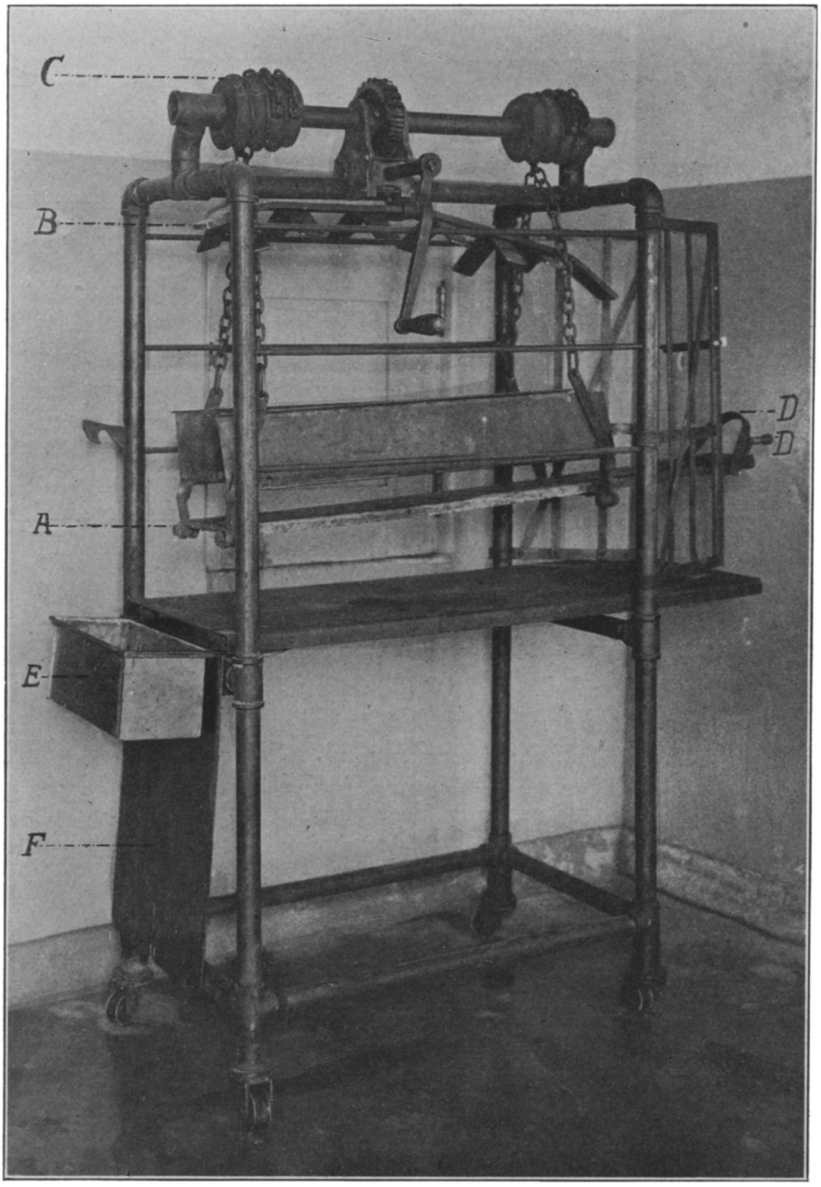

Fig. 1.—Bleeding and hypering crate. A. Carriage for hog, partially raised. B. Roof against which hog is drawn. C. Windlass for raising carriage. D. Nose holder adjusted by crank—D.[1] E. Removable pan for droppings. F. Back of crate used in loading.

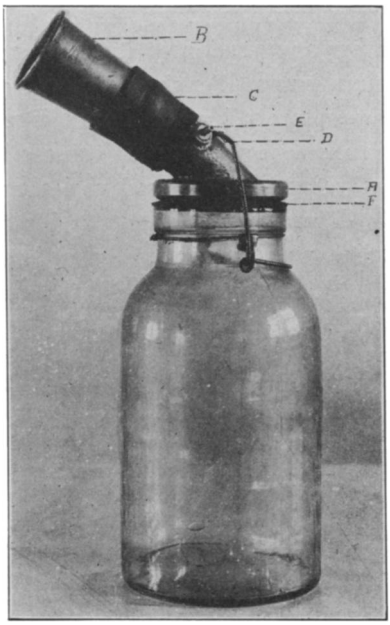

Fig. 2.—Bleeding top on jar. A. Base. B. Mouthpiece. C. Rubber connection. D. Lug for retaining wire. E. Male adapter for connecting with cotton air filter. F. Ordinary fruit jar rubber.

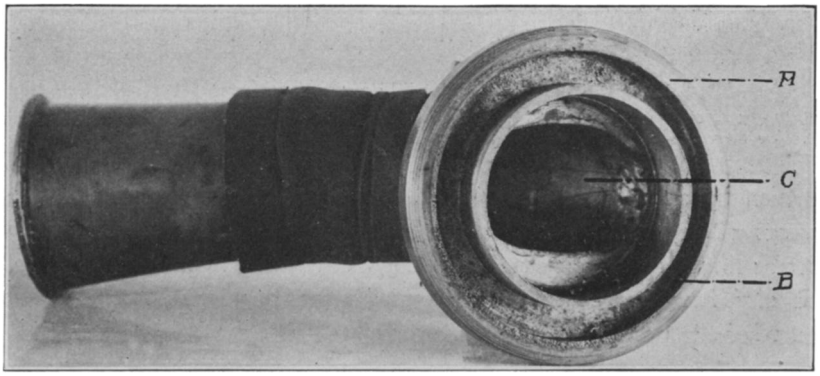

Fig. 3.—Under side of base. A. Bearing surface which rests in top of jar. B. Protecting rim which enters top of jar. C. Opening through which end of the tail enters the jar.

This is accomplished without touching the tail with the hands, or in any way contaminating any portion of it. The jar is then exhausted by means of a vacuum pump. As the vacuum increases, the flow of blood materially increases until a maximum is reached; above this degree of vacuum an increase produces a decrease in the rate of bleeding. The maximum vacuum to be used varies considerably for different individuals. A vacuum sufficient to bleed one hog may be secured from an ordinary water pump. A small rotary vacuum pump

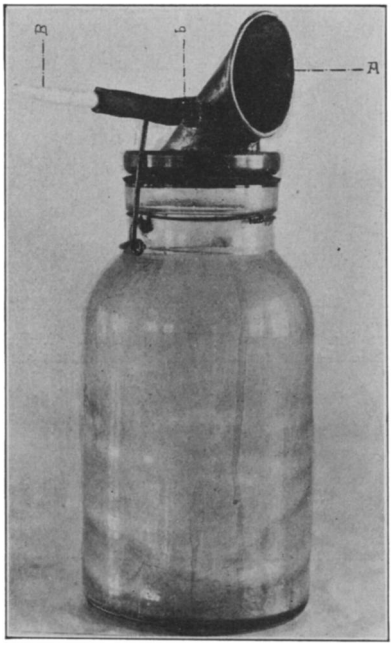

Fig. 4.—Bleeding top for short tailed hog. A. Mouthpiece direct connected with base. B. Air filter connected by female adapter to male adapter.

driven by an electric motor furnishes a satisfactory vacuum. This pump will maintain a vacuum of about twenty-eight inches of mercury. After the bleeding is started and the vacuum regulated, the blood will usually flow freely until the required quantity is drawn. In rare instances it has been found necessary to withdraw the tail and clip off another small piece, the same technic being employed as in the original operation. There is a noteworthy difference in the speed of

bleeding dependent upon the length of the tail, and consequently the size of the vessels severed. When the large blood vessels within a few inches of the body are severed, bleeding is extremely profuse.

A number of bacteriological determinations upon the blood of normal hogs, bled by the vacuum method, showed the blood drawn by this method to be without noteworthy contamination.

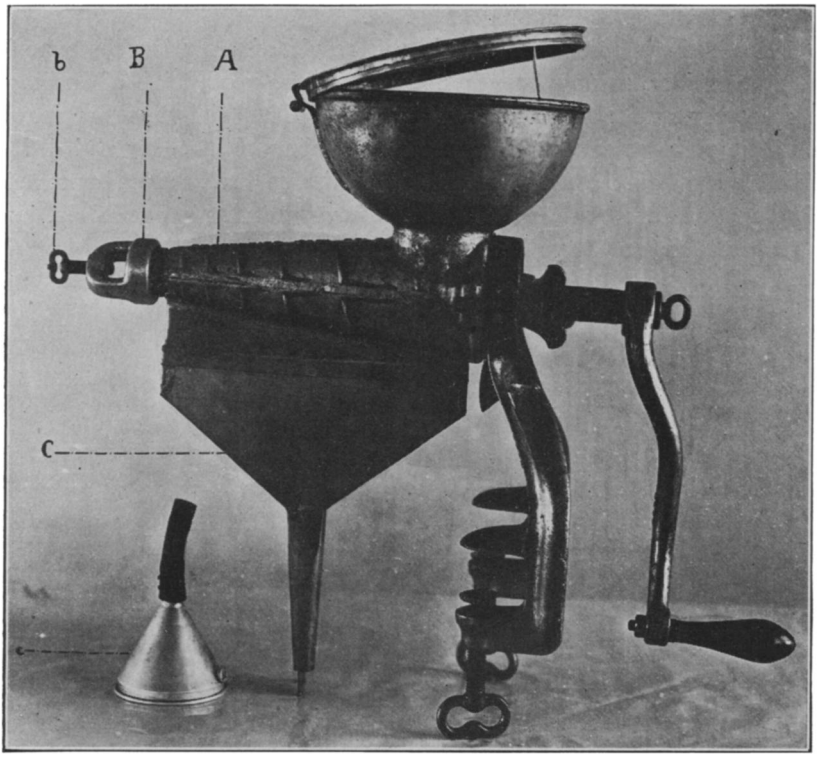

Fig. 5.—Modified juicer used for defibrinating. The lid and funnel have been added to the original machine and essential changes have been made in the interior of machine. A. Barrel in which great pressure is obtained by a spiral screw. B. Discharge for fibrin regulated by the screw (b). C. Funnel through which the defirinated blood flows. The small protective apron (c) is connected to the bottom of the funnel C by the rubber tube attached to (c).

Different views of the bleeding apparatus are shown in Figures 2 and 3. Figure 4 shows the bleeding top modified for hogs with short tails. This cut also shows the sterile air filter B to which the vacuum line is connected. This air filter was omitted from Figure 2 in order to show the male adapter E to which the filter is connected by means of a female adapter.

DEFIBRINATING AND STRAINING

For defibrinating, a fruit juicer (Fig. 5) with certain modifications is used. The blood drawn from the tail by vacuum is first gently shaken until coagulation is complete. Then the whole content of the jar is emptied into the "juicer." By slowly turning the handle of the juicer the defibrination is completed and the fibrin and the defibrinated blood are separated. Straining through gauze removes some small bits of fibrin which pass through the juicer.

The technic just described is the result of considerable experimentation and has now been in daily use in the production of antihog-cholera serum for more than six months. The trial thus far shows that the yield of serum is increased, the labor of bleeding and defibrination is reduced, and the quality of the serum greatly improved. During this time some minor defects have presented themselves, but no serious defects have become apparent.